

## Recent developments in the code RITRACKS (Relativistic Ion Tracks)

Ianik Plante<sup>1</sup>, Artem L Ponomarev<sup>1</sup>, Steve R Blattnig<sup>2</sup>

<sup>1</sup>KBRwyle, Houston, TX 77058

<sup>2</sup>NASA Langley Research Center, Hampton VA 2368

The code RITRACKS (Relativistic Ion Tracks) was developed to simulate detailed stochastic radiation track structures of ions of different types and energies. Many new capabilities were added to the code during the recent years. Several options were added to specify the times at which the tracks appear in the irradiated volume, allowing the simulation of dose-rate effects. The code has been used to simulate energy deposition in several targets: spherical, ellipsoidal and cylindrical. More recently, density changes as well as a spherical shell were implemented for spherical targets, in order to simulate energy deposition in walled tissue equivalent proportional counters. RITRACKS is used as a part of the new program BDSTracks (Biological Damage by Stochastic Tracks) to simulate several types of chromosome aberrations in various irradiation conditions. The simulation of damage to various DNA structures (linear and chromatin fiber) by direct and indirect effects has been improved and is ongoing. Many improvements were also made to the graphic user interface (GUI), including the addition of several labels allowing changes of units. A new GUI has been added to display the electron ejection vectors. The parallel calculation capabilities, notably the pre- and post-simulation processing on Windows and Linux machines have been reviewed to make them more portable between different systems. The calculation part is currently maintained in an Atlassian Stash<sup>®</sup> repository for code tracking and possibly future collaboration.